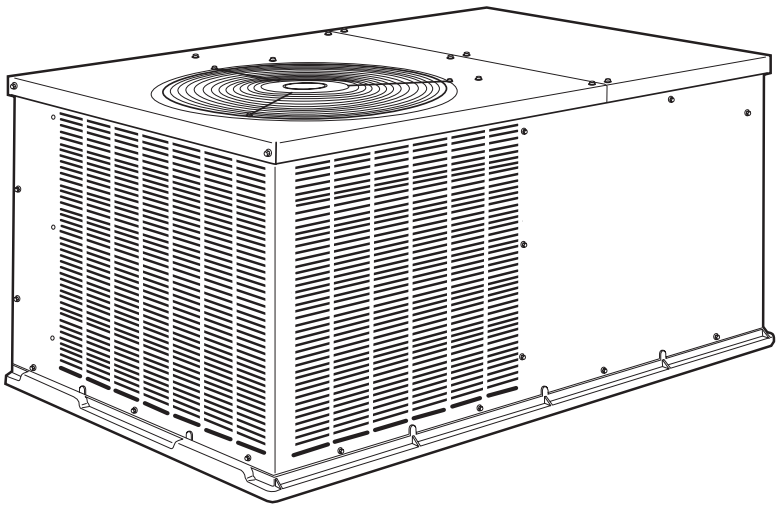
50ZH
3-PHASE SINGLE-PACKAGED HEAT PUMPS

2-1/2 to 5 Tons

Carrier®

Turn to the Experts℠

Product Data



UNIT 50ZH

Single-Packaged Heat Pump Units with:
- easy installation design
- corrosion-proof unit base
- redesigned aerodynamic fan blade for reduced sound
- sloped drain for improved indoor air quality
- scroll compressors
- through-the-top service access
- louvered panel coil protection

Features/Benefits

Compact, horizontal supply and return unit, combining easy installation and maintenance with efficient performance.

EASY TO INSTALL — The 50ZH units are lightweight, compact single-package units that are easy to handle. Every 50ZH unit has an identical 32 by 51-in. footprint to make jobsite planning simple. The precise design uses less sheet metal and makes the 50ZH units lighter than other units. The unit can be easily positioned on the jobsite with the hand-holds built into the unit basepan. Drop-in cartridge style heaters are utilized to minimize installation time.

REDESIGNED AERODYNAMIC FAN BLADE DESIGN reduces overall sound by up to 3dB; now as low as 76dB.

TOP COVER SERVICE ACCESS — The 50ZH units are designed to be serviced from the top. The split-top design allows easy access for installation and maintenance procedures on the unit. Routine maintenance tasks such as coil cleaning are sped up with through-the-top access. Multiple side panels do not need to be removed as with other units.

CORROSION PROOF UNIT BASE— The 50ZH unit features a tough, high-tech, single-piece, composite material unit base with an integrated drain. The composite material eliminates the potential problem of rust and premature replacement which are common with standard metal pans. Each 50ZH unit base is sloped to eliminate standing water. This feature minimizes

the amount of standing water inside the unit, which limits mold and mildew growth.

DURABLE STEEL CABINET — The watertight construction and corrosion-resistant finish of the 50ZH unit will keep it looking like new for years. A specialized paint treatment process ensures quality protection against the elements. A compact, low-profile design utilizes a louvered coil enclosure for maximum protection against hail damage and vandalism.

SCROLL COMPRESSORS — Each 50ZH unit comes standard with a high reliability design scroll compressor. Each scroll compressor is hermetically sealed against contamination to help promote longer life and dependable operation. All scroll compressors have internal high-pressure and overcurrent protection.

COIL EFFICIENCY — Indoor and outdoor coils are computer designed for optimum heat transfer and cooling efficiency.

CHRONOTEMP™ DEFROST SYSTEM — The system provides time/temperature-based defrost cycles to maintain unit efficiency. This highly reliable system checks for coil icing conditions at preset intervals and initiates a defrost cycle only if it is required. The defrost cycle ends as soon as defrosting is accomplished. Each defrost board is also equipped with 5-minute compressor time delay protection.

ACCESSORY ELECTRIC HEATERS — A variety of accessory electric supplementary heaters are available for the 50ZH units. Each heater is a drop-in style cartridge type with single-point electrical connections for both the heater and the unit.

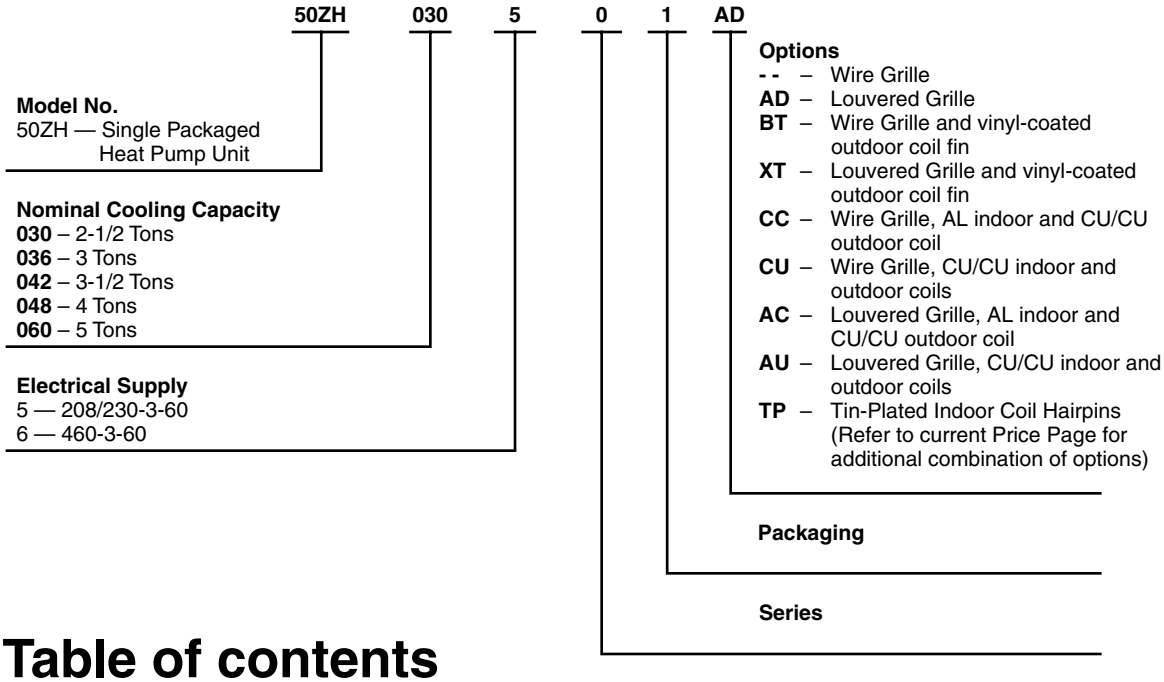
STARTER COLLARS — Starter collars are provided with each unit to provide easy connection to the structure ductwork.

DEPENDABLE COMPONENTS — Direct-drive multispeed, PSC (permanent split capacitor) blower motor is standard on all models.

Direct-drive, PSC outdoor-fan motors are designed to help reduce energy consumption and provide for cooling operation down to 40° F.

Refrigerant system is designed to provide dependability. Liquid refrigerant strainers are used to promote clean, unrestricted operation. Each unit leaves the factory with a full refrigerant charge and is fully run tested. Refrigerant service connections make checking operating pressure easier.

MODEL NUMBER NOMENCLATURE


50ZH 030 5 0 1 AD
Model No.
50ZH — Single Packaged Heat Pump Unit
Nominal Cooling Capacity
030 – 2-1/2 Tons
036 – 3 Tons
042 – 3-1/2 Tons
048 – 4 Tons
060 – 5 Tons
Electrical Supply
5 — 208/230-3-60
6 — 460-3-60
Options
- - – Wire Grille
AD – Louvered Grille
BT – Wire Grille and vinyl-coated outdoor coil fin
XT – Louvered Grille and vinyl-coated outdoor coil fin
CC – Wire Grille, AL indoor and CU/CU outdoor coil
CU – Wire Grille, CU/CU indoor and outdoor coils
AC – Louvered Grille, AL indoor and CU/CU outdoor coil
AU – Louvered Grille, CU/CU indoor and outdoor coils
TP – Tin-Plated Indoor Coil Hairpins (Refer to current Price Page for additional combination of options)
Packaging
Series

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ARI* capacities

COOLING CAPACITIES AND EFFICIENCIES

UNIT 50ZH (–SERIES)	NOMINAL TONS	STANDARD CFM	NET COOLING CAPACITIES AT 95°F (Btuh)†	SEER†	NET HEATING CAPACITIES AT 47°F (Btuh)†	HSPF†	HIGH HEAT COP AT 47°F	SOUND RATINGS** (dB)
030	2.5	1000	28,200	10.00	27,200	6.8	2.9	81
036	3.0	1200	34,200	10.00	33,800	6.8	3.0	78
042	3.5	1400	40,000	10.00	40,000	6.8	3.0	78
048	4.0	1600	44,500	10.00	45,000	6.8	3.0	80
060	5.0	2000	55,000	10.50	52,500	6.8	3.0	84

LEGEND

dB — Sound Levels (decibels)
HSPF — Heating Seasonal Performance Factor
SEER — Seasonal Energy Efficiency Ratio
COP — Coefficient of Performance

* Air Conditioning & Refrigeration Institute.

† Rated in accordance with U.S. Government DOE (Department of Energy) test procedures and/or ARI Standard 210/240-89.

** Rated in accordance with ARI Standard 270-84.

Physical data

UNIT SIZE 50ZH	030	036	042	048	060
OPERATING WEIGHT (lb)	254	277	295	328	368
COMPRESSOR TYPE	Scroll				
REFRIGERANT	R-22				
CHARGE (lb)	5.6	5.9	6.6	9.1	9.7
REFRIGERANT METERING DEVICE	Acutrol™ System				
OUTDOOR COIL	Copper Tubes, Aluminum Plate Fins				
Rows—Fins/in.	2—17	1—17	2—17	2—17	2—17
Face Area (sq ft)	6.7	11.1	9.33	11.1	12.7
OUTDOOR-FAN MOTOR	Propeller				
Nominal Cfm	2000	2600	2600	2600	3200
Nominal Rpm	1100	1100	1100	1100	1100
Motor Hp (Rpm)	1/4	1/4	1/4	1/4	1/2
Diameter (in.)	20	20	20	20	20
EVAPORATOR COIL	Copper Tubes, Aluminum Plate fins				
Rows—Fins/in.	3—15	3—15	3—15	4—15	4—15
Face Area (sq ft)	3.1	4.0	4.0	4.4	4.9
EVAPORATOR-FAN MOTOR	Direct Drive				
Blower Motor Size (in.)	10 x 8	10 x 9	10 x 9	10 x 9	10 x 10
Nominal Cfm	1000	1200	1400	1600	2000
Rpm Range	550-1000	800-1050	800-1050	1000-1100	950-1100
Number of Speeds	3	3	3	2	3
Factory Speed Setting	Med	Low	Med	Low	Low
Motor Hp	1/4	1/2	1/2	3/4	1
CONNECTING DUCT SIZES	Round				Square
Supply Air (in.)	14				13.9 x 13.9
Return Air (in.)	14				13.9 x 27.8
FIELD-SUPPLIED RETURN AIR FILTER* Throwaway (in.)	24 x 24 x 1	24 x 24 x 1	24 x 24 x 1	24 x 30 x 1	24 x 30 x 1

* Required filter sizes shown are based on the ARI (Air Conditioning & Refrigeration Institute) rated cooling airflow at a velocity of 300 ft/minute for throwaway type or 450 ft/minute for high-capacity type. Recommended filters are 1-in. thick.

Accessories

ACCESSORY
MotorMaster II® Low Ambient Control allows unit to run at outdoor temperatures down to 0°F.
Controls Upgrade Kit provides high and low pressure safety protection and protects the unit from operating in unsuitable conditions.
Crankcase Heater provides anti-floodback protection for low load applications.
Outdoor Thermostat
Corporate Thermostat
Electric Heat with Single-Point Kit (5.0 to 20.0 kW)

Corporate Thermostat provides heating and cooling unit control. The thermostat provides system and fan switching.

Electric Heaters provide heat in the unit when required. Each package has a heater module that slides into keyed mounting slots in the fan inlet. Heater sizes range from 5.0 to 20.0 kW. The electric heater design allows the use of a single-point power supply for the entire unit, resulting in lower installed costs.

Outdoor Thermostat brings second stage of 2-stage electric heater on line when the outdoor-air temperature falls below the set point.

Accessory electric heater usage

ODS CATALOG ORDERING NO.	NOMINAL CAPACITY	USED WITH SIZES				
		030	036	042	048	060
ELECTRIC HEATERS (240-3-60)						
CPHEATER029A00	5 kW		X	X	X	X
CPHEATER030A00	10 kW		X	X	X	X
CPHEATER032A00	15 kW		X	X	X	X
CPHEATER041A00	20 kW			X	X	X
ELECTRIC HEATERS (480-3-60)						
CPHEATER034A00	5 kW		X	X	X	X
CPHEATER035A00	10 kW		X	X	X	X
CPHEATER036A00	15 kW		X	X	X	X
CPHEATER037A00	20 kW			X	X	X

ODS — Order Distribution System

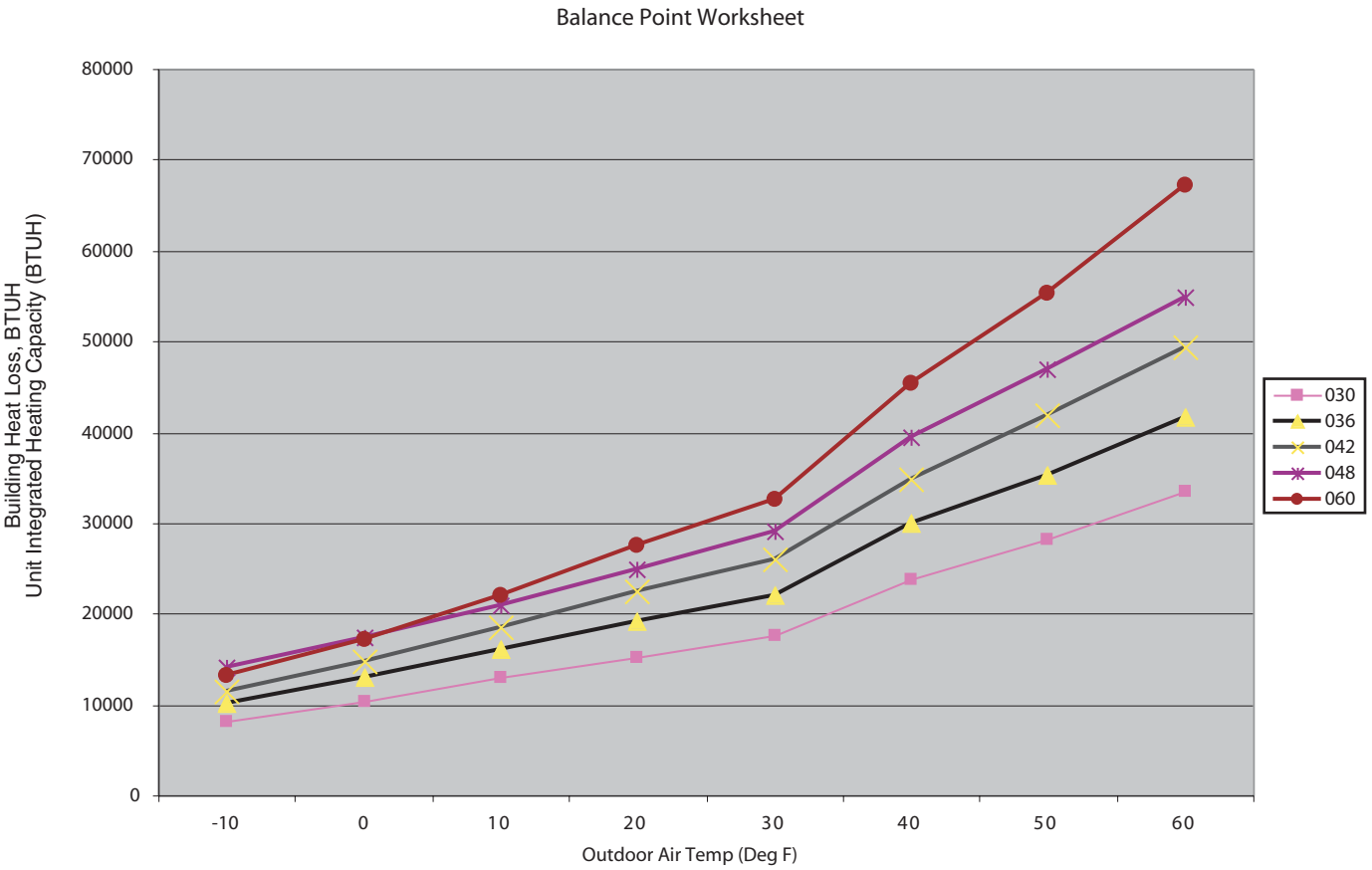
Accessories (cont)

MULTIPLICATION FACTORS

HEATER kW RATING	VOLTAGE DISTRIBUTION V/3/60	MULTIPLICATION FACTOR
240	200	0.69
	208	0.75
	230	0.92
	240	1.00
480	440	0.84
	460	0.92
	480	1.00

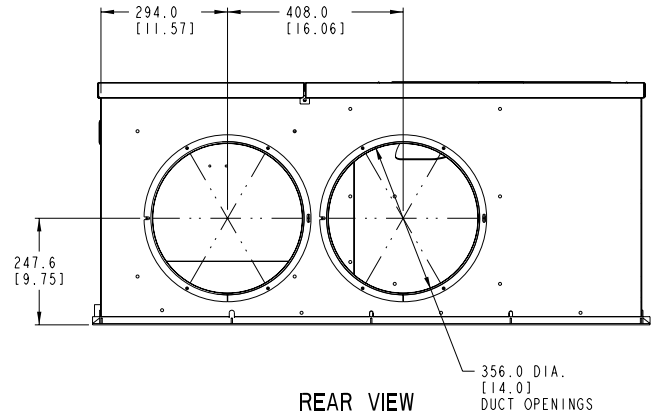
ODS — Order Distribution System

Example: 15.0 kW (at 240 v) heater on 208 v
= 15.0 (.75 mult factor)
= 11.25 capacity at 208 v



50ZH Balance Point Worksheet

Base unit dimensions—50ZH030



REAR VIEW

REQUIRED CLEARANCE TO COMBUSTIBLE MATL.

	INCHES [mm]
TOP OF UNIT	0
DUCT SIDE OF UNIT	0
SIDE OPPOSITE DUCTS	0
BOTTOM OF UNIT	0

NEC. REQUIRED CLEARANCES.

	INCHES [mm]
BETWEEN UNITS, POWER ENTRY SIDE	42.00 [1066.8]
UNIT AND UNGROUNDED SURFACES, POWER ENTRY SIDE	36.00 [914.0]
UNIT AND BLOCK OR CONCRETE WALLS AND OTHER GROUNDED SURFACES, POWER ENTRY SIDE	42.00 [1066.8]

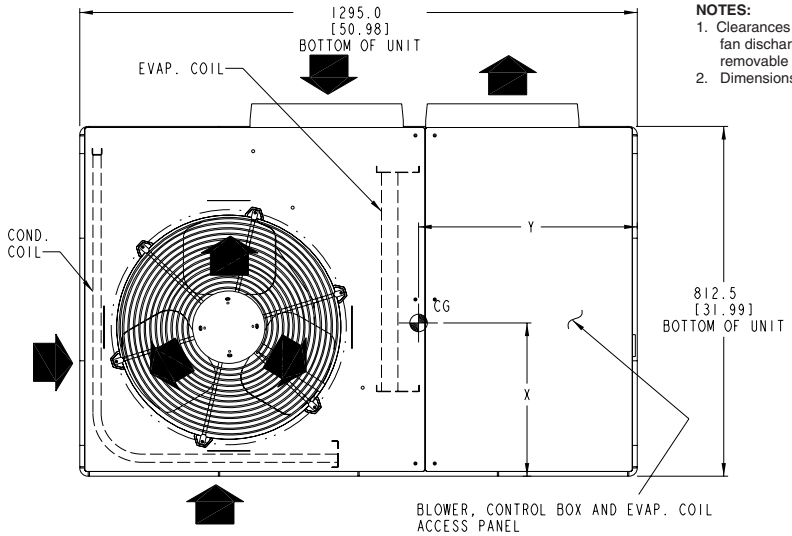
REQUIRED CLEARANCE FOR OPERATION AND SERVICING

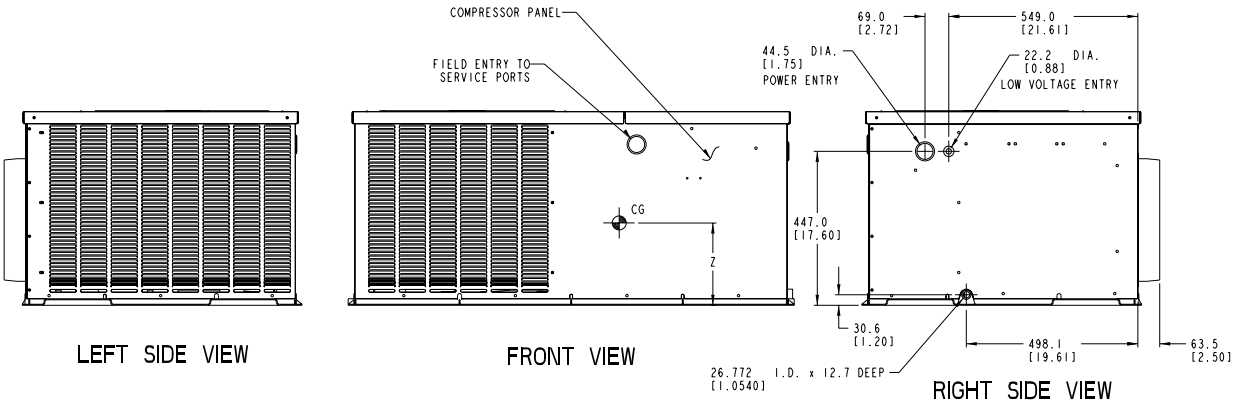
	INCHES [mm]
CONDENSER COIL ACCESS SIDE	30.00 [762.0]
POWER ENTRY SIDE (EXCEPT FOR NEC REQUIREMENTS)	30.00 [762.0]
UNIT TOP	48.00 [1219.2]
SIDE OPPOSITE DUCTS	30.00 [762.0]

LEGEND

NEC – National Electrical Code

NOTES:
1. Clearances must be maintained to prevent recirculation of air from outdoor-fan discharge, with the exception of the condenser coil (36.00 in [914.0 mm]. A removable fence or barricade requires no clearance.
2. Dimensions are in inches. Dimensions in [ ] are in millimeters.





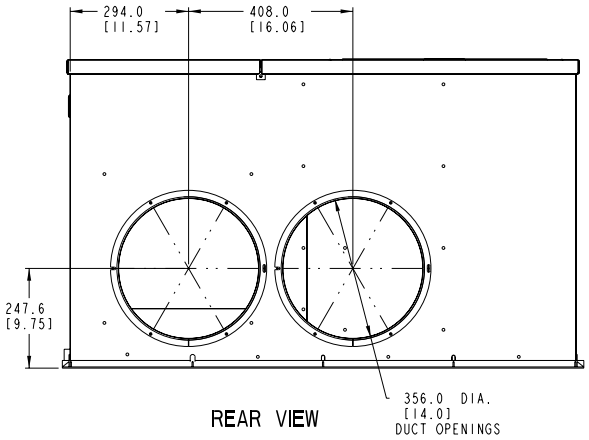
LEFT SIDE VIEW

FRONT VIEW

RIGHT SIDE VIEW

UNIT	ELECTRICAL CHARACTERISTICS	UNIT WEIGHT		CENTER OF GRAVITY mm (in.)			UNIT HEIGHT (IN.)
		Lb	Kg	X	Y	Z	
50ZH030	208/230-3-60	254	116	356 (14.0)	483 (19.0)	305 (12.0)	22.1

Base unit dimensions—50ZH036-048



REQUIRED CLEARANCE TO COMBUSTIBLE MATL.

	INCHES [mm]
TOP OF UNIT	0
DUCT SIDE OF UNIT	0
SIDE OPPOSITE DUCTS	0
BOTTOM OF UNIT	0

NEC. REQUIRED CLEARANCES.

	INCHES [mm]
BETWEEN UNITS, POWER ENTRY SIDE	42.00 [1066.8]
UNIT AND UNGROUNDED SURFACES, POWER ENTRY SIDE	36.00 [914.0]
UNIT AND BLOCK OR CONCRETE WALLS AND OTHER GROUNDED SURFACES, POWER ENTRY SIDE	42.00 [1066.8]

REQUIRED CLEARANCE FOR OPERATION AND SERVICING

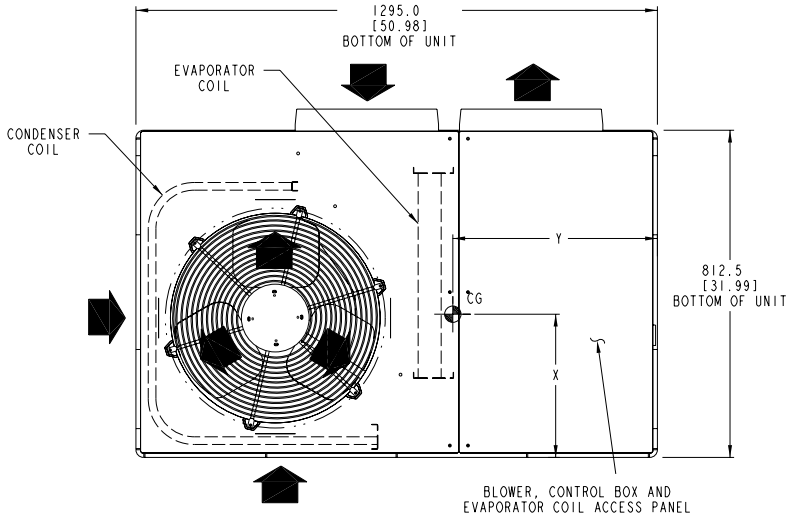
	INCHES [mm]
CONDENSER COIL ACCESS SIDE	30.00 [762.0]
POWER ENTRY SIDE (EXCEPT FOR NEC REQUIREMENTS)	30.00 [762.0]
UNIT TOP	48.00 [1219.2]
SIDE OPPOSITE DUCTS	30.00 [762.0]

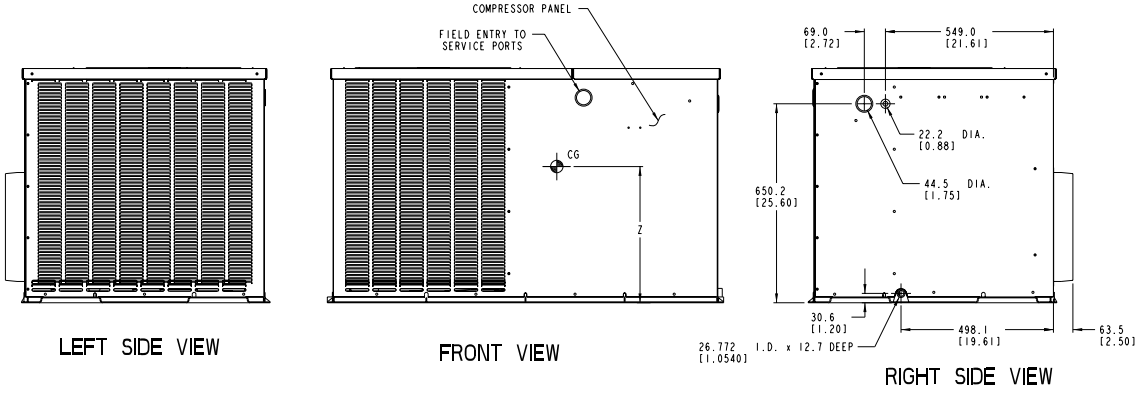
LEGEND

NEC – National Electrical Code

NOTES:

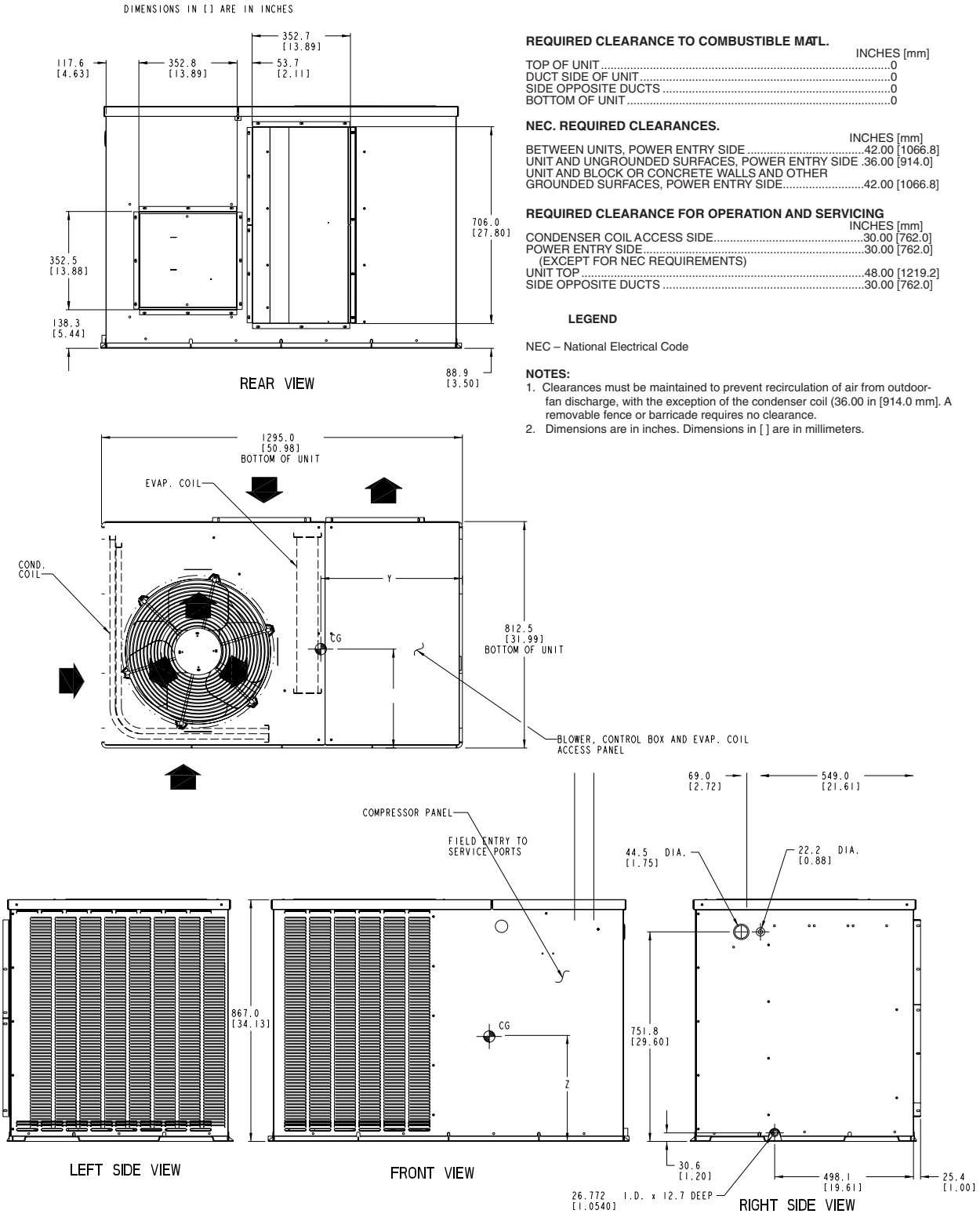
1. Clearances must be maintained to prevent recirculation of air from outdoor-fan discharge, with the exception of the condenser coil (36.00 in [914.0 mm]. A removable fence or barricade requires no clearance.
2. Dimensions are in inches. Dimensions in [ ] are in millimeters.





UNIT	ELECTRICAL CHARACTERISTICS	UNIT WEIGHT		CENTER OF GRAVITY mm (in.)			UNIT HEIGHT (IN.)
		Lb	Kg	X	Y	Z	
50ZH036	208/230-3-60, 460-3-60	277	126	356 (14.0)	483 (19.0)	381 (15.0)	30.1
50ZH042	208/230-3-60, 460-3-60	277	126	356 (14.0)	483 (19.0)	381 (15.0)	30.1
50ZH048	208/230-3-60, 460-3-60	277	126	356 (14.0)	483 (19.0)	381 (15.0)	30.1

Base unit dimensions—50ZH060



REQUIRED CLEARANCE TO COMBUSTIBLE MATL.

	INCHES [mm]
TOP OF UNIT	0
DUCT SIDE OF UNIT	0
SIDE OPPOSITE DUCTS	0
BOTTOM OF UNIT	0

NEC. REQUIRED CLEARANCES.

	INCHES [mm]
BETWEEN UNITS, POWER ENTRY SIDE	42.00 [1066.8]
UNIT AND UNGROUNDED SURFACES, POWER ENTRY SIDE	36.00 [914.0]
UNIT AND BLOCK OR CONCRETE WALLS AND OTHER GROUNDED SURFACES, POWER ENTRY SIDE	42.00 [1066.8]

REQUIRED CLEARANCE FOR OPERATION AND SERVICING

	INCHES [mm]
CONDENSER COIL ACCESS SIDE	30.00 [762.0]
POWER ENTRY SIDE (EXCEPT FOR NEC REQUIREMENTS)	30.00 [762.0]
UNIT TOP	48.00 [1219.2]
SIDE OPPOSITE DUCTS	30.00 [762.0]

LEGEND

NEC – National Electrical Code

NOTES:
1. Clearances must be maintained to prevent recirculation of air from outdoor-fan discharge, with the exception of the condenser coil (36.00 in [914.0 mm]. A removable fence or barricade requires no clearance.
2. Dimensions are in inches. Dimensions in [ ] are in millimeters.

UNIT	ELECTRICAL CHARACTERISTICS V-Ph-Hz	UNIT WEIGHT		CENTER OF GRAVITY mm (in.)			UNIT HEIGHT (IN.)
		Lb	Kg	X	Y	Z	
50ZH060	208/230-3-60, 460-3-60	368	167	356 (14.00)	508 (20.00)	406 (16.00)	35.8

Selection Procedure

I DETERMINE COOLING AND HEATING REQUIREMENTS AT DESIGN CONDITIONS:

Given:

Required Cooling Capacity (TC)	28,000 Btuh
Sensible Heat Capacity (SHC)	20,500 Btuh
Required Heating Capacity	28,550 Btuh
Outdoor Entering-Air Temperature	95° F
Outdoor-Air Winter Design Temperature	20° F
Indoor-Air Winter Design Temperature	70° F
Indoor Entering-Air Temperature	80° F edb, 67° F ewb
Indoor-Air Quantity	1125 cfm
External Static Pressure	0.20 in. wg
Electrical Characteristics (V-Ph-Hz)	208/230-3-60

edb — entering dry bulb
ewb — entering wet bulb

II SELECT UNIT BASED ON REQUIRED COOLING CAPACITY.

Enter Cooling Capacities table at condenser entering temperature of 95° F, indoor air entering at 1125 cfm and 67° F ewb (entering wet bulb). The 50ZH030 unit will provide a total cooling capacity of 28,800 Btuh and a sensible heat capacity of 21,700 Btuh.

For indoor-air temperature other than 80° F edb (entering dry bulb), calcualte sensible heat capacity correction, as required, using the formula found in Note 3 following the cooling capacities tables.

NOTE: Unit ratings are net capacities.

III SELECT ELECTRIC HEAT.

Enter the 50ZH030 Heating Capacities table at 1125 cfm. At 70° F return indoor air and 20° F air entering outdoor coil, the inegrated heating capacity is 15,500 Btuh. (Select integrated heating capacity value since deductions for outdoor-coil frost and defrosting have already been made. No correction is required.)

The required heating capacity is 28,550 Btuh. Therefore, 13,050 Btuh (28,550 – 15,500) additional electric heat is required.

Determine additional electric heat capacity in kW.

$$\frac{13{,}050 \text{ Btuh}}{3414 \text{ Btuh/kW}} = 3.8 \text{ kW of heat required}$$

Enter the Accessory Electric Heater Usage table on page 4 for 208/240 v. three-phase, 50ZH030 unit. The 5-kW heater at 240 v most closely satisfies the heating required. To calculate kW at 230 v, multiply the heater kW by multiplication factor 0.92 found in the Multiplication Factors table on page 5.

5 kW x 0.92 = 4.6 kW

4.6 x 3414 = 15,704 Btuh

To calculate kW at 208 v, see Multiplication Factors table on page 5.

Total unit heating capacity is 31,204 Btuh (15,500 + 15,704).

IV DETERMINE FAN SPEED AND POWER REQUIREMENTS AT DESIGN CONDITIONS.

Before entering the air delivery tables, calculate the total static pressure required. From the given, the Accessory Electric Heat Pressure Drop table, Wet Coil Pressure Drop table, and the Filter Pressure Drop table, find:

External static pressure	0.20 in. wg
Filter	0.09 in. wg
Electric heat	0.11 in. wg
Wet coil	0.07 in. wg
Total static pressure	0.47 in. wg

Enter the table for Dry Coil Air Delivery — Horizontal Discharge at 1125 cfm and 230-v high speed. By interpolation, the standard motor will deliver 0.48 in. wg static pressure. This will adequately handle job requirements.

Performance data

COOLING CAPACITY

50ZH030 (2-1/2 TONS)

Temp (F) Air Ent Outdoor coil (edb)		Indoor Entering Air—CFM/BF											
		875/0.10				1000/0.11				1125/0.12			
		Indoor Entering Air — Ewb (F)											
		72	67	63*	62	72	67	63*	62	72	67	63*	62
85	TC	31.6	29.2	27.1	26.4	32.2	29.6	27.5	26.9	31.9	29.9	27.8	27.2
	SHC	15.0	19.8	19.5	23.9	15.7	20.9	20.7	25.4	15.9	22.0	21.7	26.6
	kW	2.80	2.76	2.73	2.71	2.87	2.82	2.79	2.77	2.90	2.88	2.84	2.83
95	TC	30.9	28.1	26.0	25.3	31.2	28.2	26.4	25.7	31.4	28.8	26.7	26.1
	SHC	15.0	19.4	19.1	23.4	15.6	20.6	20.3	24.9	16.1	21.7	21.3	26.0
	kW	3.05	3.00	2.96	2.94	3.11	3.05	3.02	3.00	3.16	3.11	3.07	3.06
105	TC	29.7	26.9	24.8	24.1	30.0	27.2	25.1	24.5	30.1	27.5	25.4	25.1
	SHC	14.6	19.0	18.6	22.8	15.2	20.2	19.8	24.2	15.7	21.4	20.9	25.1
	kW	3.31	3.26	3.21	3.19	3.37	3.32	3.27	3.26	3.41	3.37	3.34	3.33
115	TC	28.4	25.5	23.5	22.9	28.7	25.8	23.8	23.4	28.8	26.1	24.0	24.0
	SHC	14.2	18.6	18.1	22.2	14.9	19.8	19.2	23.4	15.4	20.9	20.3	24.0
	kW	3.58	3.53	3.46	3.44	3.64	3.60	3.53	3.51	3.69	3.65	3.59	3.59

See page 15 for cooling notes.

HEATING CAPACITY

50ZH030

Temp (F) Air Ent Indoor Coil	Indoor Air CFM (Std)		Air Temperature Entering Outdoor Coil (F db at 70% rh)									
			-10	0	10	17	20	30	40	47	50	60
60	875	Cap.	9.13 | 8.40	11.5 | 10.6	14.1 | 13.0	16.1 | 14.7	17.0 | 15.4	20.4 | 17.8	24.2 | 24.2	27.5 | 27.5	28.6 | 28.6	33.9 | 33.9
		kW	2.12	2.18	2.25	2.29	2.31	2.40	2.49	2.58	2.61	2.77
	1000	Cap.	9.30 | 8.56	11.7 | 10.8	14.3 | 13.1	16.3 | 14.8	17.2 | 15.6	20.6 | 18.0	24.4 | 24.4	27.8 | 27.8	28.9 | 28.9	34.3 | 34.3
		kW	2.15	2.20	2.26	2.30	2.32	2.39	2.48	2.56	2.59	2.73
	1125	Cap.	9.46 | 8.70	11.9 | 10.9	14.5 | 13.3	16.4 | 15.0	17.4 | 15.8	20.8 | 18.2	24.6 | 24.6	28.0 | 28.0	29.2 | 29.2	34.6 | 34.6
		kW	2.19	2.23	2.28	2.32	2.33	2.40	2.48	2.56	2.58	2.71
70	875	Cap.	8.62 | 7.93	11.1 | 10.2	13.8 | 12.7	15.8 | 14.4	16.7 | 15.1	20.0 | 17.5	23.7 | 23.7	26.9 | 26.9	28.0 | 28.0	33.1 | 33.1
		kW	2.26	2.33	2.41	2.47	2.49	2.58	2.68	2.78	2.81	2.97
	1000	Cap.	8.81 | 8.11	11.3 | 10.4	14.0 | 12.9	16.0 | 14.6	16.9 | 15.3	20.2 | 17.7	23.9 | 23.9	27.2 | 27.2	28.3 | 28.3	33.6 | 33.6
		kW	2.29	2.35	2.42	2.47	2.49	2.57	2.66	2.75	2.78	2.92
	1125	Cap.	8.97 | 8.25	11.5 | 10.5	14.2 | 13.0	16.2 | 14.7	17.1 | 15.5	20.4 | 17.9	24.2 | 24.2	27.5 | 27.5	28.6 | 28.6	33.9 | 33.9
		kW	2.32	2.38	2.44	2.48	2.50	2.57	2.66	2.74	2.77	2.90
80	875	Cap.	7.99 | 7.35	10.6 | 9.71	13.3 | 12.2	15.5 | 14.1	16.4 | 14.9	19.6 | 17.2	23.2 | 23.2	26.3 | 26.3	27.4 | 27.4	32.4 | 32.4
		kW	2.39	2.49	2.58	2.64	2.67	2.78	2.89	2.99	3.03	3.20
	1000	Cap.	8.18 | 7.53	10.7 | 9.89	13.6 | 12.4	15.7 | 14.3	16.6 | 15.0	19.8 | 17.4	23.5 | 23.5	26.6 | 26.6	27.7 | 27.7	32.8 | 32.8
		kW	2.42	2.51	2.59	2.65	2.67	2.77	2.87	2.96	2.99	3.14
	1125	Cap.	8.36 | 7.69	10.9 | 10.1	13.8 | 12.6	15.9 | 14.5	16.8 | 15.2	20.0 | 17.6	23.7 | 23.7	26.9 | 26.9	28.0 | 28.0	33.2 | 33.2
		kW	2.45	2.53	2.61	2.66	2.68	2.77	2.86	2.94	2.97	3.11

LEGEND

Cap. — Heating Capacity (1000 Btuh) (Includes Indoor-Fan Motor Heat)
db — Dry Bulb
kW — Total Power Input (Includes Compressor Motor Power Input Outdoor-Fan Motor Input, and Indoor-Fan Motor Input)
rh — Relative Humidity

NOTES:

1. ▭ indicates integrated ratings
2. Integrated capacity is maximum (instantaneous) capacity less the effect of frost on the outdoor coil and the heat required to defrost it.

Performance data (cont)

COOLING CAPACITY

50ZH036 (3 TONS)

Temp (F) Air Ent Outdoor coil (edb)		Evaporator Air—CFM/BF											
		1050/0.09				1200/0.11				1350/0.12			
		Evaporator Air — Ewb (F)											
		72	67	63*	62	72	67	63*	62	72	67	63*	62
85	TC	39.9	35.8	33.1	32.3	40.5	36.4	33.7	32.9	40.9	36.8	34.0	33.3
	SHC	19.1	24.2	23.4	29.0	19.9	25.7	24.8	30.8	20.7	27.0	26.0	32.4
	kW	3.49	3.37	3.29	3.27	3.57	3.45	3.36	3.35	3.64	3.52	3.43	3.42
95	TC	28.5	34.5	31.8	31.0	39.1	34.2	32.3	31.6	39.4	35.4	32.7	32.0
	SHC	18.7	23.7	22.9	28.4	19.5	25.2	24.3	30.3	20.4	26.6	25.6	31.8
	kW	3.80	3.67	3.58	3.56	3.88	3.75	3.66	3.64	3.95	3.82	3.73	3.72
105	TC	36.9	33.0	30.4	29.6	37.5	33.5	30.9	30.1	37.9	33.8	31.2	30.8
	SHC	18.2	23.2	22.4	27.8	19.0	24.7	23.8	29.6	19.9	26.1	25.1	30.8
	kW	4.15	4.01	3.91	3.89	4.23	4.08	3.99	3.97	4.30	4.16	4.06	4.05
115	TC	35.2	31.4	28.9	28.2	35.7	31.9	29.3	28.7	36.1	32.1	29.6	29.6
	SHC	17.6	22.6	21.8	27.1	18.5	24.1	23.2	28.7	19.3	25.5	24.5	29.5
	kW	4.51	4.36	4.26	4.24	4.60	4.44	4.34	4.33	4.68	4.52	4.14	4.42

See page 15 for cooling notes.

HEATING CAPACITY

50ZH036

Temp (F) Air Ent Indoor Coil	Indoor Air CFM (Std)		Air Temperature Entering Outdoor Coil (F db at 70% rh)																	
			-10		0		10		17		20		30		40		47		50		60	
60	1050	Cap.	11.4	10.5	14.4	13.2	17.6	16.2	20.1	18.3	21.2	19.2	25.3	22.2	30.1	30.1	34.0	34.0	35.4	35.4	41.9	41.9
		kW	2.48		2.56		2.65		2.71		2.74		2.85		2.98		3.09		3.12		3.31	
	1200	Cap.	11.6	10.7	14.6	13.4	17.9	16.4	20.3	18.5	21.4	19.4	25.6	22.4	30.4	30.4	34.3	34.3	35.8	35.8	42.2	42.2
		kW	2.51		2.58		2.66		2.71		2.74		2.84		2.95		3.05		3.08		3.24	
	1350	Cap.	11.8	10.9	14.8	13.6	18.1	16.6	20.5	18.7	21.6	19.6	25.8	22.6	30.6	30.6	34.6	34.6	36.0	36.0	42.4	42.4
		kW	2.55		2.61		2.68		2.73		2.75		2.84		2.94		3.03		3.06		3.19	
70	1050	Cap.	10.8	9.96	13.9	12.8	17.3	15.8	19.8	18.1	20.9	19.0	25.0	21.9	29.7	29.7	33.5	33.5	34.9	34.9	41.2	41.2
		kW	2.66		2.76		2.86		2.94		2.97		3.09		3.23		3.35		3.39		3.59	
	1200	Cap.	11.1	10.2	14.1	13.0	17.5	16.1	20.0	18.2	21.1	19.2	25.2	22.1	29.9	29.9	33.8	33.8	35.2	35.2	41.7	41.7
		kW	2.69		2.78		2.87		2.93		2.96		3.07		3.19		3.30		3.34		3.52	
	1350	Cap.	11.3	10.4	14.3	13.2	17.7	16.2	20.2	18.4	21.3	19.3	25.4	22.3	30.2	30.2	34.1	34.1	35.5	35.5	42.0	42.0
		kW	2.73		2.81		2.89		2.94		2.97		3.07		3.18		3.27		3.31		3.47	
80	1050	Cap.	10.1	9.29	13.3	12.3	16.8	15.5	19.5	17.8	20.7	18.8	24.9	21.8	29.4	29.4	33.4	33.4	34.7	34.7	40.8	40.8
		kW	2.84		2.97		3.10		3.19		3.23		3.37		3.53		3.67		3.71		3.91	
	1200	Cap.	10.3	9.52	13.6	12.5	17.1	15.7	19.8	18.0	21.0	19.1	25.2	22.0	29.7	29.7	33.8	33.8	35.1	35.1	41.3	41.3
		kW	2.87		2.99		3.10		3.18		3.22		3.35		3.48		3.61		3.64		3.82	
	1350	Cap.	10.6	9.72	13.8	12.7	17.3	15.9	20.0	18.2	21.3	19.3	25.4	22.3	29.9	29.9	34.1	34.1	35.4	35.4	41.5	41.5
		kW	2.91		3.02		3.12		3.19		3.22		3.34		3.46		3.57		3.61		3.75	

LEGEND

Cap. — Heating Capacity (1000 Btuh) (Includes Indoor-Fan Motor Heat)
db — Dry Bulb
kW — Total Power Input (Includes Compressor Motor Power Input, Outdoor-Fan Motor Input, and Indoor-Fan Motor Input)
rh — Relative Humidity

NOTES:

1. ▭ indicates integrated ratings.
2. Integrated capacity is maximum (instantaneous) capacity less the effect of frost on the outdoor coil and the heat required to defrost it.

Performance data (cont)

COOLING CAPACITY

50ZH042 (3-1/2 TONS)

Temp (F) Air Ent Outdoor coil (edb)		Indoor Entering — CFM/BF											
		1225/0.11				1400/0.13				1575/0.14			
		Indoor Entering — Ewb (F)											
		72	67	63*	62	72	67	63*	62	72	67	63*	62
85	TC	45.9	41.1	38.0	37.0	46.6	41.8	38.6	37.6	47.2	42.3	39.1	38.2
	SHC	22.1	28.0	27.1	33.5	23.2	29.8	28.7	35.6	24.2	31.5	30.3	37.5
	kW	4.28	4.15	4.06	4.04	4.37	4.24	4.15	4.13	4.45	4.32	4.23	4.21
95	TC	43.9	39.2	36.2	35.2	44.6	40.0	36.8	35.8	45.2	40.3	37.2	36.4
	SHC	21.5	27.3	26.4	32.7	22.5	29.1	28.0	34.7	23.5	30.8	29.6	36.4
	kW	4.65	4.51	4.42	4.39	4.74	4.60	4.50	4.48	4.82	4.68	4.58	4.56
105	TC	41.8	37.2	34.3	33.4	42.5	37.8	34.8	34.0	42.9	38.2	35.2	34.9
	SHC	20.8	26.6	25.6	31.8	21.8	28.3	27.2	33.7	22.8	30.0	28.8	34.9
	kW	5.00	4.90	4.80	4.78	5.09	4.99	4.89	4.87	5.17	5.07	4.97	4.97
115	TC	39.7	35.2	32.4	31.5	40.2	35.7	32.8	32.3	40.7	36.0	33.1	33.3
	SHC	20.1	25.8	24.8	30.8	21.1	27.5	26.4	32.3	22.1	29.2	27.9	33.3
	kW	5.44	5.32	5.21	5.19	5.53	5.41	5.30	5.29	5.61	5.50	5.40	5.40

See page 15 for cooling notes.

HEATING CAPACITY

50ZH042

Temp (F) Air Ent Indoor Coil	Indoor Air CFM (Std)		Air Temperature Entering Outdoor Coil (F db at 70% rh)									
			-10	0	10	17	20	30	40	47	50	60
60	1225	Cap.	13.4 | 12.4	16.9 | 15.5	20.7 | 19.0	23.7 | 21.6	25.2 | 22.9	29.8 | 26.1	35.2 | 35.2	40.3 | 40.3	42.4 | 42.4	49.7 | 49.7
		kW	2.87	2.98	3.09	3.17	3.22	3.35	3.51	3.66	3.73	3.97
	1400	Cap.	13.4 | 12.3	16.8 | 15.4	20.9 | 19.2	23.9 | 21.8	25.3 | 23.0	30.2 | 26.5	35.6 | 35.6	40.8 | 40.8	42.7 | 42.7	50.4 | 50.4
		kW	2.90	3.00	3.10	3.18	3.22	3.34	3.48	3.62	3.67	3.90
	1575	Cap.	13.3 | 12.3	17.0 | 15.6	21.1 | 19.4	24.2 | 22.1	25.6 | 23.2	30.5 | 26.8	36.0 | 36.0	41.2 | 41.2	43.0 | 43.0	50.9 | 50.9
		kW	2.95	3.04	3.13	3.20	3.23	3.35	3.48	3.61	3.65	3.86
70	1225	Cap.	12.5 | 11.5	16.1 | 14.8	20.0 | 18.3	23.1 | 21.1	24.6 | 22.4	29.2 | 25.6	34.5 | 34.6	39.5 | 39.5	41.6 | 41.6	48.7 | 48.7
		kW	3.06	3.19	3.32	3.43	3.47	3.63	3.80	3.97	4.04	4.30
	1400	Cap.	12.5 | 11.5	16.0 | 14.7	20.2 | 18.5	23.4 | 21.3	24.8 | 22.5	29.6 | 25.9	34.9 | 34.9	40.0 | 40.0	41.8 | 41.8	49.3 | 49.3
		kW	3.09	3.21	3.34	3.43	3.47	3.61	3.76	3.92	3.97	4.21
	1575	Cap.	12.4 | 11.4	16.2 | 14.9	20.5 | 18.8	23.7 | 21.6	25.1 | 22.7	29.9 | 26.2	35.3 | 35.3	40.4 | 40.4	42.2 | 42.2	49.9 | 49.9
		kW	3.14	3.25	3.36	3.45	3.48	3.61	3.75	3.89	3.94	4.16
80	1225	Cap.	11.4 | 10.5	15.1 | 13.9	19.1 | 17.5	22.4 | 20.4	24.0 | 21.7	28.6 | 25.1	33.8 | 33.8	38.7 | 38.7	40.8 | 40.8	47.7 | 47.7
		kW	3.25	3.41	3.57	3.69	3.75	3.93	4.13	3.31	4.38	4.66
	1400	Cap.	11.4 | 10.5	15.0 | 13.8	19.3 | 17.8	22.7 | 20.7	24.2 | 21.9	29.0 | 25.4	34.2 | 34.2	39.2 | 39.2	41.0 | 41.0	48.3 | 48.3
		kW	3.29	3.44	3.59	3.70	3.74	3.91	4.08	4.25	4.30	4.56
	1575	Cap.	11.4 | 10.4	15.2 | 14.0	19.7 | 18.0	23.0 | 21.0	24.5 | 22.2	29.3 | 25.7	34.6 | 34.6	39.6 | 39.6	41.1 | 41.4	48.9 | 48.9
		kW	3.33	3.47	3.61	3.71	3.75	3.90	4.06	4.21	4.26	4.50

LEGEND

Cap. — Heating Capacity (1000 Btuh) (Includes Indoor-Fan Motor Heat)
db — Dry Bulb
kW — Total Power Input (Includes Compressor Motor Power Input Outdoor-Fan Motor Input, and Indoor-Fan Motor Input)
rh — Relative Humidity

NOTES:

1. ▭ indicates integrated ratings
2. Integrated capacity is maximum (instantaneous) capacity less the effect of frost on the outdoor coil and the heat required to defrost it.

Performance data (cont)

COOLING CAPACITY

50ZH048 (4 TONS)

Temp (F) Air Ent Outdoor coil (edb)		Indoor Entering—CFM/BF											
		1400/0.04				1600/0.05				1800/0.06			
		Indoor Entering Air — Ewb (F)											
		72	67	63*	62	72	67	63*	62	72	67	63*	62
85	TC	46.5	44.8	43.3	42.9	46.2	44.5	43.2	42.9	45.5	43.9	43.0	42.8
	SHC	23.8	32.1	31.9	40.4	23.9	32.8	32.8	41.6	23.7	33.4	34.0	42.5
	kW	4.2	4.2	4.1	4.1	4.4	4.4	4.3	4.3	4.7	4.6	4.5	4.5
95	TC	46.8	44.6	43.2	42.8	46.4	44.3	43.3	43.0	45.8	43.8	43.0	42.8
	SHC	24.5	32.6	33.0	41.5	24.7	33.9	34.1	42.1	24.8	34.9	34.5	42.1
	kW	4.6	4.6	4.5	4.5	4.8	4.8	4.7	4.7	5.1	5.0	4.9	4.9
105	TC	46.2	43.9	42.5	42.2	45.9	43.6	42.9	42.8	45.4	43.0	42.5	42.4
	SHC	24.6	33.0	33.2	41.5	25.1	34.4	33.6	41.0	25.3	35.6	35.3	42.1
	kW	5.0	5.0	4.9	4.9	5.2	5.2	5.1	5.1	5.5	5.4	5.3	5.3
115	TC	45.2	42.6	41.2	40.9	44.8	42.3	41.9	41.9	44.3	41.9	41.7	41.7
	SHC	24.4	33.0	40.6	40.6	24.9	34.7	39.9	40.3	25.3	35.8	40.2	40.2
	kW	5.4	5.4	5.3	5.3	5.7	5.6	5.5	5.5	5.9	5.8	5.7	5.7

See page 15 for cooling notes.

HEATING CAPACITY

50ZH048

Temp (F) Air Ent Indoor Coil	Indoor Air CFM (Std)		Air Temperature Entering Outdoor Coil (F db at 70% rh)									
			-10	0	10	17	20	30	40	47	50	60
60	1400	Cap.	12.48 11.54	17.03 15.67	21.59 19.52	27.90 25.44	26.72 24.24	33.72 29.54	41.10 41.10	47.00 47.00	48.69 48.69	54.21 54.21
		kW	3.01	3.11	3.22	3.29	3.35	3.56	3.81	4.00	4.00	4.09
	1600	Cap.	16.54 16.30	20.32 18.70	24.10 22.12	26.74 24.38	28.49 26.84	34.30 30.05	41.61 41.61	46.91 46.91	48.39 48.39	51.91 51.91
		kW	3.27	3.33	3.40	3.45	3.50	3.67	3.91	4.02	4.04	4.11
	1800	Cap.	20.40 18.87	23.41 21.54	26.43 24.26	28.53 26.02	30.09 27.29	34.92 30.60	41.87 41.87	46.62 46.62	47.44 47.44	49.85 49.85
		kW	3.49	3.54	3.59	3.62	3.67	3.84	4.02	4.15	4.16	4.21
70	1400	Cap.	11.27 10.43	16.06 14.78	20.85 19.14	24.20 22.07	26.21 23.77	33.59 29.43	40.95 40.95	46.91 46.91	48.85 48.85	54.94 54.94
		kW	3.20	3.33	3.46	3.55	3.62	3.86	4.13	4.34	4.40	4.48
	1600	Cap.	14.02 12.97	18.33 16.87	22.64 20.78	25.66 23.39	27.55 24.98	34.21 29.98	41.55 41.55	47.35 47.35	48.77 48.77	53.87 53.87
		kW	3.45	3.55	3.64	3.71	3.77	3.98	4.24	4.41	4.42	4.50
	1800	Cap.	17.86 16.51	21.48 19.78	25.10 23.03	27.63 25.19	29.35 26.62	34.98 30.65	42.23 42.23	47.48 47.48	48.95 48.95	52.05 52.05
		kW	3.75	3.81	3.87	3.92	3.98	4.15	4.41	4.53	4.55	4.60
80	1400	Cap.	11.01 10.18	15.83 14.57	20.65 18.96	24.03 21.91	26.04 23.52	33.47 29.33	41.01 41.01	46.64 46.64	48.62 48.62	55.07 55.07
		kW	3.45	3.59	3.73	3.84	3.92	4.19	4.49	4.71	4.77	4.89
	1600	Cap.	13.02 12.04	17.53 16.13	22.05 20.24	25.21 22.99	27.16 24.63	34.11 29.89	41.61 41.61	47.34 47.34	49.04 49.04	54.55 54.55
		kW	3.70	3.81	3.93	4.00	4.08	4.31	4.60	4.81	4.83	4.91
	1800	Cap.	15.84 14.65	19.89 18.30	23.94 21.98	26.78 24.42	28.61 25.95	34.92 30.59	42.30 42.30	47.74 47.74	49.37 49.37	53.66 53.66
		kW	3.99	4.07	4.16	4.22	4.29	4.50	4.78	4.95	4.97	5.02

LEGEND

Cap. — Heating Capacity (1000 Btuh) (Includes Indoor-Fan Motor Heat)
db — Dry Bulb
kW — Total Power Input (Includes Compressor Motor Power Input, Outdoor-Fan Motor Input, and Indoor-Fan Motor Input)
rh — Relative Humidity

NOTES:

1. ▭ indicates integrated ratings
2. Integrated capacity is maximum (instantaneous) capacity less the effect of frost on the outdoor coil and the heat required to defrost it.

Performance data (cont)

COOLING CAPACITY

50ZH060 (5 TONS)

Temp (F) Air Ent Outdoor coil (edb)		Evaporator Air—CFM/BF											
		1750/0.08				2000/0.08				2250/0.09			
		Evaporator Air — Ewb (F)											
		72	67	63*	62	72	67	63*	62	72	67	63*	62
85	TC	65.7	59.9	55.5	54.4	66.4	60.8	56.5	55.7	67.3	61.7	57.4	57.4
	SHC	33.7	43.4	50.8	52.5	35.2	46.5	54.4	55.7	36.8	49.4	57.3	57.4
	kW	5.55	5.45	5.35	5.33	5.67	5.58	5.48	5.47	5.82	5.71	5.61	5.62
95	TC	63.1	55.0	52.8	51.8	64.1	58.1	53.7	53.5	64.7	58.8	55.3	55.0
	SHC	32.9	41.9	49.6	51.1	34.5	45.4	53.1	53.4	36.3	48.3	55.2	55.0
	kW	5.94	5.85	5.74	5.72	6.08	5.98	5.87	5.88	6.21	6.09	6.02	6.03
105	TC	60.2	53.6	49.9	49.3	61.0	54.9	51.2	51.1	61.7	55.7	52.7	52.6
	SHC	31.9	40.8	48.3	49.3	33.6	44.3	51.1	51.1	35.3	47.2	52.7	52.6
	kW	6.37	6.28	6.18	6.16	6.50	6.40	6.32	6.33	6.64	6.52	6.47	6.48
115	TC	57.3	51.2	47.1	46.7	58.0	51.8	48.7	48.7	58.6	52.6	50.1	50.2
	SHC	30.9	40.1	47.0	46.7	32.7	43.1	48.7	48.7	34.3	46.1	50.1	50.1
	kW	6.80	6.71	6.61	6.60	6.92	6.83	6.77	6.78	7.07	6.95	6.92	6.93

See page 15 for cooling notes.

HEATING CAPACITY

50ZH060

Temp (F) Air Ent Indoor Coil	Indoor Air CFM (Std)		Air Temperature Entering Outdoor Coil (F db at 70% rh)									
			-10	0	10	17	20	30	40	47	50	60
60	1800	Cap.	15.1 | 13.9	19.4 | 17.8	24.3 | 22.3	28.6 | 26.1	30.8 | 27.9	37.7 | 33.0	45.8 | 45.8	53.5 | 53.5	56.3 | 56.3	68.1 | 68.1
		kW	3.48	3.64	3.82	3.97	4.05	4.28	4.56	4.79	4.88	5.26
	2000	Cap.	15.1 | 13.9	19.4 | 17.8	24.6 | 22.6	28.8 | 26.3	30.9 | 28.1	38.0 | 33.3	46.3 | 46.3	53.9 | 53.9	56.5 | 56.5	68.7 | 68.7
		kW	3.53	3.69	3.87	4.01	4.08	4.31	4.57	4.80	4.88	5.24
	2250	Cap.	15.1 | 13.9	19.8 | 18.2	25.2 | 23.1	29.3 | 26.8	31.5 | 28.5	28.7 | 33.9l	47.1 | 47.1	54.7 | 54.7	57.3 | 57.3	69.8 | 69.8
		kW	3.60	3.76	3.94	4.08	4.14	4.36	4.62	4.83	4.91	5.26
70	1800	Cap.	14.4 | 13.2	18.7 | 17.2	23.7 | 21.8	28.0 | 25.5	30.2 | 27.4	37.0 | 32.4	44.9 | 44.9	52.5 | 52.5	55.2 | 55.2	66.7 | 66.7
		kW	3.71	3.90	4.10	4.25	4.33	4.59	4.88	5.13	5.23	5.63
	2000	Cap.	14.3 | 13.2	18.7 | 17.2	24.0 | 22.0	28.3 | 25.8	30.4 | 27.5	37.3 | 32.7	45.3 | 45.3	52.8 | 52.8	55.4 | 55.4	67.3 | 67.3
		kW	3.76	3.94	4.14	4.29	4.36	4.61	4.89	5.12	5.21	5.60
	2250	Cap.	14.3 | 13.2	19.0 | 17.5	24.2 | 22.2	28.7 | 26.2	30.8 | 28.0	37.9 | 33.2	46.1 | 46.1	53.6 | 53.6	56.1 | 56.1	68.3 | 68.3
		kW	3.83	4.01	4.19	4.34	4.42	4.66	4.92	5.15	5.23	5.60
80	1800	Cap.	13.5 | 12.4	17.8 | 16.4	22.9 | 21.1	27.2 | 24.8	29.3 | 26.6	36.2 | 31.7	43.9 | 43.9	51.4 | 51.4	54.2 | 54.2	65.3 | 65.3
		kW	3.97	4.18	4.40	4.57	4.65	4.93	5.24	5.51	5.62	6.04
	2000	Cap.	13.5 | 12.4	17.8 | 16.4	23.2 | 21.3	27.5 | 25.1	29.6 | 26.8	36.6 | 32.0	44.4 | 44.4	51.8 | 51.8	54.4 | 54.4	65.9 | 65.9
		kW	4.02	4.22	4.43	4.60	4.67	4.94	5.24	5.49	5.59	5.99
	2250	Cap.	13.5 | 12.4	18.1 | 16.7	23.6 | 21.7	27.9 | 25.5	30.0 | 27.2	37.1 | 32.5	44.9 | 44.9	52.4 | 52.4	54.9 | 54.9	66.7 | 66.7
		kW	4.08	4.28	4.49	4.64	4.72	4.98	5.26	5.50	5.59	5.98

LEGEND

Cap. — Heating Capacity (1000 Btuh) (Includes Indoor-Fan Motor Heat)
db — Dry Bulb
kW — Total Power Input (Includes Compressor Motor Power Input Outdoor-Fan Motor Input, and Indoor-Fan Motor Input)
rh — Relative Humidity

NOTES:

1. ▭ indicates integrated ratings
2. Integrated capacity is maximum (instantaneous) capacity less the effect of frost on the outdoor coil and the heat required to defrost it.

LEGEND

BF — Bypass Factor
edb — Entering Dry-Bulb
Ewb — Entering Wet-Bulb
kW — Total Unit Power Input
ldb — Leaving Dry-Bulb
lwb — Leaving Wet-Bulb
SHC — Sensible Heat Capacity (1000 Btuh) Net
TC — Total Capacity (1000 Btuh) Net

*At 75°F entering dry bulb (Tennessee Valley Authority [TVA] rating conditions); all others at 80°F entering dry bulb.

NOTES:

1. Direct interpolation is permissible. Do not extrapolate.
2. The following formulas may be used:

$$t_{ldb} = t_{edb} - \frac{\text{sensible capacity (Btuh)}}{1.10 \times \text{cfm}}$$

t_{lwb} = Wet-bulb temperature corresponding to enthalpy of leaving indoor coil (h_{lwb})

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.5 \times \text{cfm}}$$

Where: h_{ewb} = Enthalpy of air entering evaporator coil

3. The sensible heat capacity is based on 80°F edb temperature of air entering indoor coil.
   Below 80°F edb, subtract (corr factor x cfm) from the sensible heat capacity.
   Above 80°F edb, add (corr factor x cfm) to the sensible heat capacity.
   Correction Factor = 1.10 x (1–BF) x (edb – 80).

WET COIL PRESSURE DROP

UNIT SIZE 50ZH	AIRFLOW (cfm)	PRESSURE DROP (in. wg)
030	900	0.06
	1000	0.06
	1200	0.08
036	1000	0.04
	1200	0.05
	1400	0.07
	1600	0.08
042	1000	0.04
	1200	0.06
	1400	0.08
	1600	0.09
048	1400	0.07
	1600	0.08
	1800	0.09
060	1700	0.07
	1800	0.08
	2100	0.09
	2300	0.10

FILTER PRESSURE DROP (in. wg)

UNIT SIZE 50ZH	FILTER SIZE (in.)	CFM																		
		500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
030-042	24 x 24	0.06	0.07	0.08	0.08	0.09	0.09	0.09	0.10	0.11	0.12	0.14	0.15	—	—	—	—	—	—	—
048, 060	24 x 30	—	—	—	—	—	—	—	—	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18

ACCESSORY ELECTRIC HEAT PRESSURE DROP (in. wg)

HEATER kW	CFM								
	600	800	1000	1200	1400	1600	1800	2000	2200
5-20	0.06	0.08	0.10	0.13	0.15	0.18	0.20	0.23	0.25

Performance data (cont)

DRY COIL AIR DELIVERY* — HORIZONTAL DISCHARGE
(Deduct 10% for 208 Volt Operation)

230 AND 460 VOLT HORIZONTAL DISCHARGE

Unit 50ZH	Motor Speed	Air Delivery	External Static Pressure (in.wg)								
			0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
030	Low	Watts	288	285	282	279	274	268	261	—	—
		CFM	875	820	802	734	668	582	478	—	—
	Med	Watts	390	383	378	369	360	350	340	—	—
		CFM	1131	1090	1038	978	917	830	721	—	—
	High	Watts	528	520	510	495	480	460	450	—	—
		CFM	1891	1338	1285	1200	1115	1018	920	—	—
036	Low	Watts	450	435	420	400	380	335	326	311	—
		CFM	1231	1218	1204	1120	1008	950	863	751	—
	Med	Watts	470	450	445	410	388	359	338	321	—
		CFM	1302	1264	1205	1163	1081	940	873	783	—
	High	Watts	660	635	610	575	540	505	485	460	—
		CFM	1700	1660	1581	1450	1297	1190	1095	989	—
042	Low	Watts	478	458	440	411	378	350	327	317	—
		CFM	1303	1270	1224	1179	1126	1022	911	816	—
	Med	Watts	481	468	450	438	404	370	338	320	—
		CFM	1310	1280	1241	1181	1110	1022	943	811	—
	High	Watts	—	798	678	647	618	578	540	500	460
		CFM	—	1736	1688	1618	1510	1421	1309	1187	1060
048	Low	Watts	—	—	801	760	730	688	650	600	570
		CFM	—	—	1898	1841	1757	1682	1564	1429	1333
	High	Watts	—	—	870	842	818	782	696	632	628
		CFM	—	—	2000	1903	1799	1718	1625	1446	1365
060†	Low	Watts	890	850	810	790	735	680	580	480	422
		CFM	1834	1820	1791	1762	1703	1640	1415	1159	950
	Med	Watts	1040	1018	1000	950	890	835	7990	650	580
		CFM	2230	2102	2025	1960	1901	1855	1752	1468	1121
	High	Watts	1073	1038	1001	958	896	840	800	691	575
		CFM	2230	2202	2160	2122	2052	1926	1791	1588	1202

*Air delivery values are based on operating voltage of 230 v or 460 v, wet coil, without filter or electric heater. Deduct filter and electric heater pressure drops to obtain static pressure available for ducting.

NOTES:

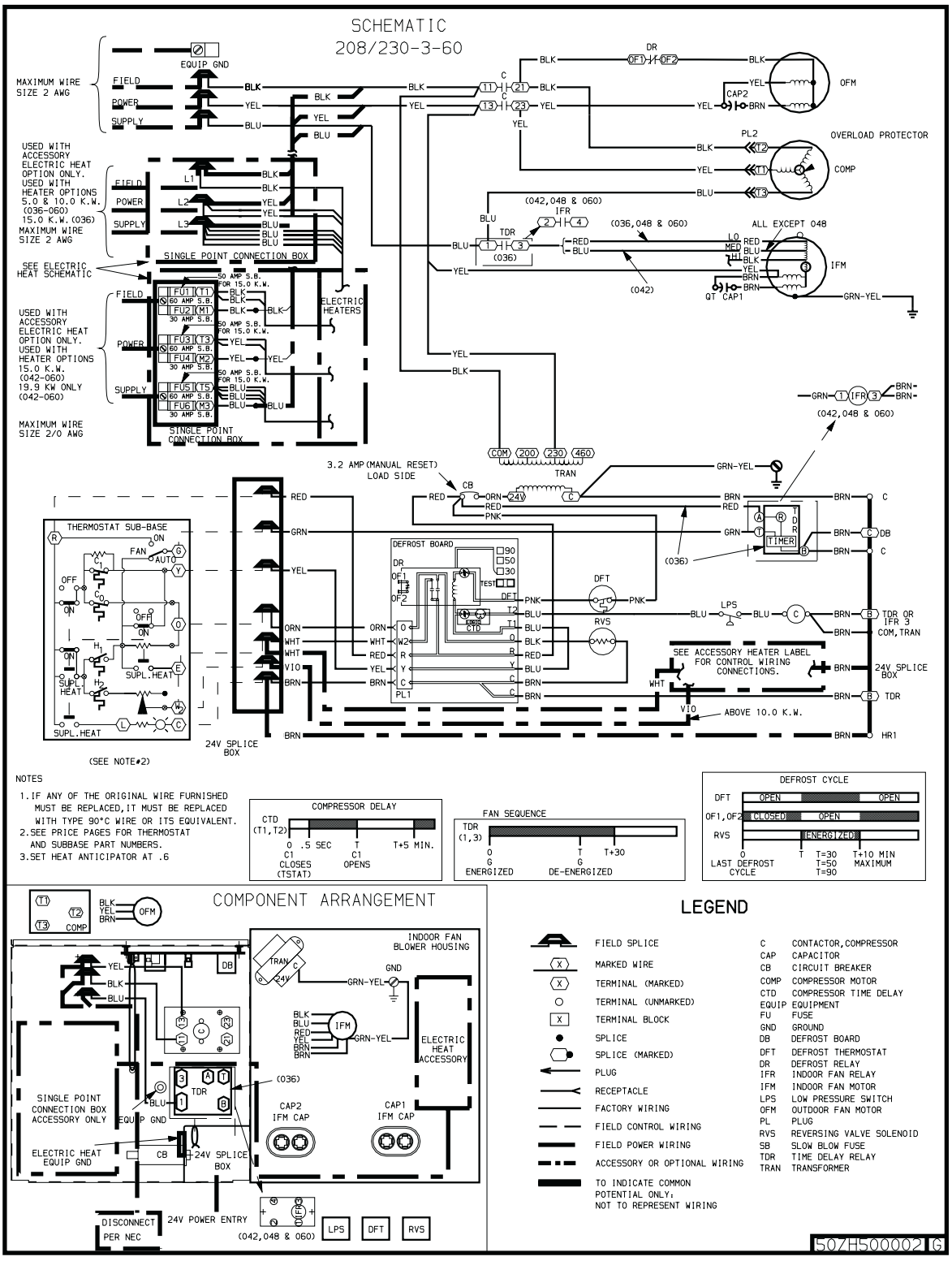
1. Do not operate the unit at a cooling ariflow that is less than 350 cfm for each 12,000 Btuh of rated cooling capacity. Evaporator coil frosting may occur at airflows below this point.
2. Dashes indicate portions of table that are beyond the blower motor capacity or are not recommended.

† 460-v motors have 2 speeds (060 only).

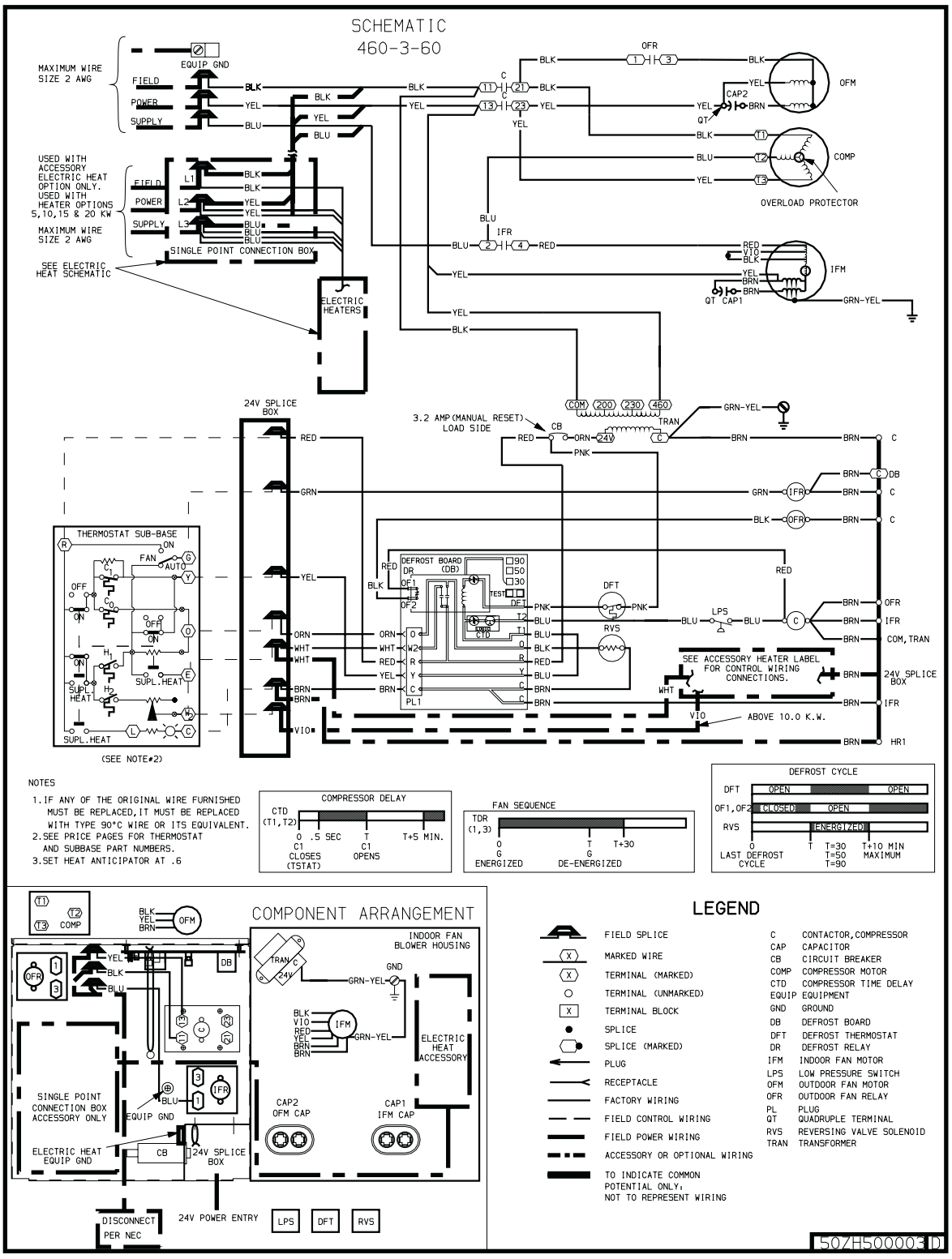
Electrical data

UNIT SIZE 50ZH (–SERIES)	NOMINAL V-PH-Hz	IFM TYPE	VOLTAGE RANGE		COMPRESSOR		OFM FLA	IFM FLA	ELECTRIC HEAT		POWER SUPPLY		
			Min	Max	RLA	LRA			Nominal kW*	FLA	MCA	MAX FUSE OR CKT. BKR.	MOCP
030	208/230-3-60	Std	187	254	10.0	63.0	1.5	2.8	—/— 3.8/5.0 7.5/10.0 11.3/15.0	—/— 10.5/12.0 20.8/24.1 31.4/36.1	16.8/16.8 29.9/31.8 42.8/46.9 56.1/61.9	20/20 30/35 45/50 —/—	— — — 60/70
036	208/230-3-60	Std	187	254	11.4	77.0	1.5	2.8	—/— 3.8/5.0 7.5/10.0 11.3/15.0	—/— 10.5/12.0 20.8/24.1 31.4/36.1	18.6/18.6 31.1/23.6 44.6/48.7 57.8/63.7	25/25 35/35 45/50 60/—	— — — —/70
	460-3-60	Std	414	508	5.7	39.0	0.8	1.5	—/— 5.0 10.0 15.0	—/— 6.0 12.0 18.0	9.9 16.9 24.4 31.9	15 20 25 35	— — — —
042	208/230-3-60	Std	187	254	13.9	88.0	1.5	2.8	—/— 3.8/5.0 7.5/10.0 11.3/15.0 15.0/20.0	—/— 10.5/12.0 20.8/24.1 31.4/36.1 41.4/47.9	21.7/21.7 34.8/36.7 47.7/51.8 60.9/66.8 73.4/81.6	30/30 35/40 50/50 — —	— — — 70/70 80/90
	460-3-60	Std	414	508	6.8	44.0	0.8	1.5	—/— 5.0 10.0 15.0 20.0	—/— 6.0 12.0 18.0 24.1	10.8 18.3 25.8 33.3 40.9	15 20 30 35 45	— — — — —
048	208/230-3-60	Std	187	254	12.8	93.0	1.5	4.2	—/— 3.8/5.0 7.5/10.0 11.3/15.0 15.0/20.0	—/— 18.3/20.8 36.1/41.7 54.3/62.5 72.1/83.3	21.7/21.7 34.8/36.7 47.7/51.8 61.0/66.8 73.7/81.8	25/25 35/40 50/60 — —	— — — 70/70 80/90
	460-3-60	Std	414	508	6.4	46.5	0.8	2.1	—/— 5.0 10.0 15.0 20.0	—/— 6.0 12.0 18.0 24.1	10.9 18.4 25.9 33.4 41.0	15 20 30 35 45	— — — — —
060	208/230-3-60	Std	187	254	15.9	124.0	3.1	6.2	—/— 3.8/5.0 7.5/10.0 11.3/15.0 14.9/19.9	—/— 10.5/12.0 20.8/24.1 31.4/36.1 41.4/47.9	29.2/29.2 42.3/44.2 55.2/59.3 68.4/74.3 81.2/89.3	35/35 45/45 60/60 — —	— — — 70/80 90/90
	460-3-60	Std	414	508	8.0	59.6	1.5	3.2	—/— 5.0 10.0 15.0 20.0	—/— 6.0 12.0 18.0 24.1	14.7 22.2 29.7 37.2 44.8	20 25 30 40 45	— — — — —

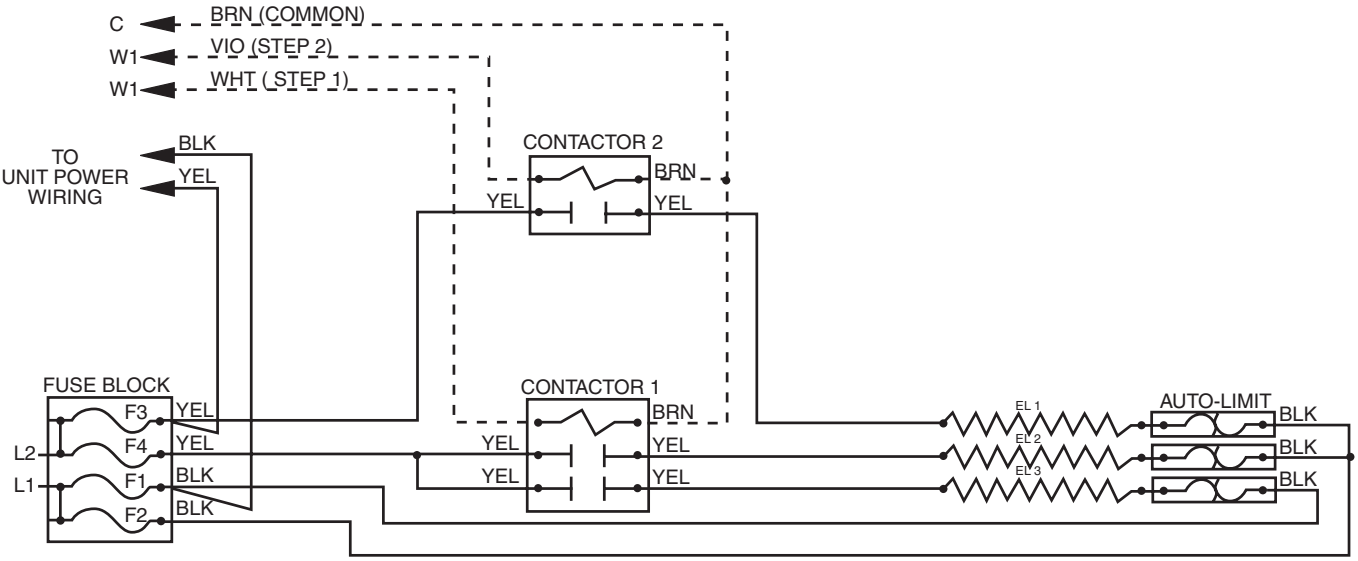
Typical wiring schematic — 208/230-3-60



Typical wiring schematic — 460-3-60



Typical wiring schematic (cont)



Electric Heater Wiring

LEGEND

FLA — Full Load Amps
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
RLA — Rated Load Amps

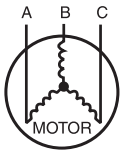
*Heater capacity (KW) based on heater voltage of 208v, 240v, & 480v. If power distribution voltage to unit varies from rated heater voltage, heater KW will vary accordingly.

NOTES:
1. In compliance with NEC (National Electrical Code) requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be Power Supply fuse. The CGA (Canadian Gas Association) units may be fuse or circuit breaker.
2. Minimum wire size is based on 60 C copper wire. If other than 60 C wire is used, or if length exceeds wire length in table, determine size from NEC.
3. Unbalanced 3-Phase Supply Voltage
   Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percentage of voltage imbalance.

% Voltage imbalance

$$= 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

EXAMPLE: Supply voltage is 460-3-60.



AB = 452 v
BC = 464 v
AC = 455 v

$$\text{Average Voltage} = \frac{452 + 464 + 455}{3}$$

$$= \frac{1371}{3}$$

$$= 457$$

Determine maximum deviation from average voltage.
(AB) 457 452 = 5 v
(BC) 464 457 = 7 v
(AC) 457 455 = 2 v

Maximum deviation is 7 v.

Determine percent of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{7}{457}$$

$$= 1.53\%$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

Sequence of operation

When power is supplied to unit, the transformer (TRAN) is energized.

Cooling — With the thermostat subbase in the cooling position, and when the space temperature comes within 2°F of the cooling set point, the thermostat makes circuit R-O. This energizes the reversing valve solenoid (RVS) and places the unit in standby condition for cooling.

As the space temperature continues to rise, the second stage of the thermostat makes, closoing circuit R-Y. When compressor time delay (5 ± 2 minutes) is completed, a circuit is made to contactor (C), starting the compressor (COMP) and outdoor-fan motor (OFM). Circuit R-G is made at the same time, energizing the indoor-fan relay (IFR) and starting the indoor-fan motor (IFM) after a 1-second delay.

When the thermostat is satisfied, contacts open, deenergizing C. The COMP and OFM stop, and the IFM stops after a 30 second time delay.

Heating — On a call for heat, thermostat makes circuits R-Y and R-G.

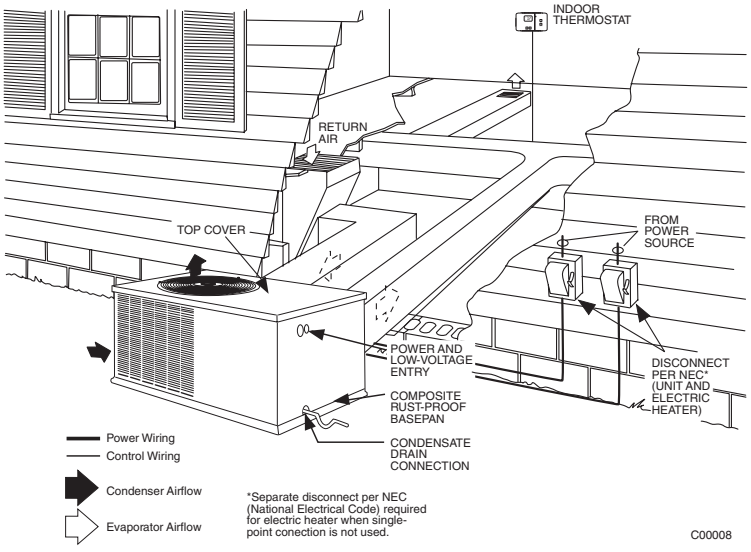
When compressor time delay (5 ± 2 minutes) is completed, a circuit is made to C, starting COMP and OFM. Circuit R-G also is completed, energizing IFR and starting IFM after a 1-second delay.

Should room temperature continue to fall, circuit R-W is made through second-stage thermostat bulb. If optional electric heat package is used, a relay is energized, bringing on first bank of supplemental electric heat. When thermostat is satisfied, contacts open, deenergizing contactor and relay; motors and heaters deenergize. The IFM may be controlled by a time-delay relay that keeps the fan on for 30 seconds.

Defrost — Defrost board (DB) is a time and temperature control, which includes a field-selectable time period between checks for defrost (30, 50, and 90 minutes). Electronic timer and defrost cycle start only when contactor is energized and defrost thermostat (DFT) is closed.

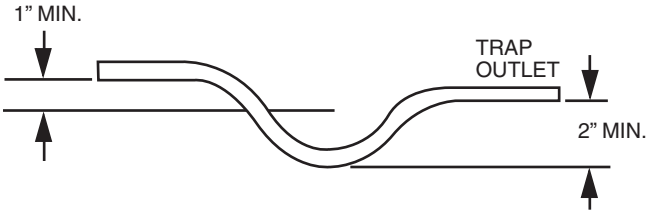
Defrost mode is identical to cooling mode, except outdoor-fan motor stops and a bank of optional electric heat turns on to warm air supplying the conditioned space.

Typical Installation



Application data

Condensate trap — A 2-in. condensate trap must be field supplied.



Maximum cooling airflow — To minimize the possibility of condensate blow-off from the evaporator, airflow through the units should not exceed 450 cfm/ton.

Minimum cooling airflow — The minimum cooling airflow is 350 cfm/ton.

Minimum cooling operating outdoor air temperature — All standard units have a minimum ambient operating temperature of 40°F. With accessory low ambient temperature kit, units can operate at temperatures down to 0°F.

Maximum operating outdoor air temperature — Maximum outdoor operating air temperature for cooling is 125°F.

Guide specifications

SMALL PACKAGE PRODUCT AIR-TO-AIR HEAT PUMP
CONSTANT VOLUME APPLICATION
HVAC GUIDE SPECIFICATIONS
SIZE RANGE: 2-1/2 TO 5 TONS, NOMINAL (COOLING)
21,800 TO 52,500 BTUH, NOMINAL (HEATING)

MODEL NUMBER: 50ZH
PART I - GENERAL
1.01 SYSTEM DESCRIPTION
Outdoor package, electrically controlled, air-to-air heat pump utilizing a scroll compressor for heating and cooling duty. Unit shall discharge supply air horizontally as shown on contract drawings.
1.02 QUALITY ASSURANCE
A. Unit shall be rated in accordance with ARI Standards 210/240-89, and 270-84. Designed in accordance with UL Standard 1995.
B. Unit shall be designed to conform to ASHRAE 15.
C. Unit shall be UL listed as a total package for safety requirements.
D. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
1.03 DELIVERY, STORAGE, AND HANDLING
Unit shall be stored and handled per manufacturer's recommendations.
PART 2- PRODUCTS
2.01 EQUIPMENT
A. General:
Factory-assembled, single piece, air-to-air heat pump. Contained within the unit enclosure shall be all factory wiring, piping, controls, and refrigerant charge (R-22).
B. Unit Cabinet:
1. Unit cabinet shall be constructed of phosphated, bonderized, zinc-coated, prepainted steel.
2. Basepan shall be made of a single-piece non-corrosive, composite material.
3. Indoor fan compartment cabinet surfaces shall be insulated with a minimum 1/2 in. thick, flexible insulation, coated on the air side, with aluminum foil-faced insulation.
4. Cabinet panels shall be easily removable for servicing.
5. Unit shall have a factory-installed, sloped, non-corrosive, condensate drain.
6. Unit insulation conforms to ASHRAE 62P.
C. Fans:
1. Indoor Blower (Indoor Fan):
a. Fan shall be 2- or 3-speed, direct drive as shown on the equipment drawings.
b. Fan wheel shall be made from steel, be double-inlet type. It shall have forward-curved blades with a corrosion-resistant finish and shall be dynamically balanced.
2. Outdoor fan shall be of the direct-driven propeller type with aluminum blades, riveted to corrosion-resistant steel spiders. It shall be dynamically balanced, and shall discharge air upwards.
D. Compressor:
Fully hermetic scroll, type with internal and external vibration isolation.
E. Coils:
1. Indoor and outdoor coils shall have aluminum-plate fins mechanically bonded to seamless copper tubes with all joints brazed.
2. Tube sheet openings shall be bellied to prevent tube wear.
3. Outdoor coil shall be protected by metal louvered panels.
F. Refrigerant Components:
1. Fixed orifice feed system.
2. Service gage connections on suction, discharge and liquid lines.
3. Equipped with liquid line strainers.
4. Equipped with liquid line loss of charge switch.
G. Controls and Safeties:
1. Unit Controls:
a. Unit shall be complete with self-contained low-voltage control circuit.
b. Defrost board is equipped with 5 minute compressor time delay protection.
c. Unit shall incorporate an outdoor-coil defrost system to prevent excessive frost accumulation during heating duty, and shall be controlled as follows:
1) Defrost shall be initiated on the basis of time and coil temperature.
2) A 30/50/90 minute timer shall activate defrost cycle only if coil temperature is low enough to indicate a heavy frost condition.
3) Defrost cycle shall terminate when defrost thermostat is satisfied or shall have a positive termination time of 10 minutes.
2. Safeties:
Compressor, overtemperature, overcurrent.
H. Operating Characteristics:
1. Unit shall be capable of starting and running at 115°F ambient outdoor temperature per maximum load criteria of ARI Standard 240-89.
2. Compressor with standard controls shall be capable of operation down to 40° F ambient outdoor temperature in cooling duty.
3. Compressor shall be capable of operation in heating duty down to –20° F ambient outdoor-air temperature.
4. Unit shall be capable of simultaneous heating duty and defrost cycle operation when using electric heaters indicated in Section K, Special Features.
5. Compressors will be prevented from restarting for a minimum of 5 minutes after shutdown.
I. Electrical Requirements:
All unit power wiring shall enter unit cabinet at a single location.
J. Motors:
1. Compressor motors shall be of the refrigerant-cooled type with line break thermal and current overload protection.

Guide specifications (cont)

2. All fan motors shall have permanently lubricated bearings and inherent automatic-reset thermal overload protection.
3. Outdoor-fan motor shall be totally enclosed.

K. Special Features:
1. Electric Resistance Heaters:
   a. Open-wire nichrome elements with all necessary safety and operating controls.
   b. Heaters are UL listed as indicated on basic unit informative plate.
   c. Each heater assembly shall include the following safety features:
      1) Automatic-reset switches
      2) Heat limiters for primary and secondary, overcurrent, and thermal protection.
   d. Available with power single-point connections.
2. Outdoor Thermostat Kit:
   Thermostat allows for staging of electric heaters based on outdoor-air temperature.
3. Thermostat and Subbase:
   Provides staged cooling and heating automatic (or manual) changeover, fan control.
4. Electronic Programmable Thermostat:
   Thermostat provides 2-stage heating and 2-stage cooling control with remote communication ability.

L. Grille
1. Louvered Grille:
   Louvered grille shall be standard on all units.

M. Special Features Available
1. Coil Options:
   Shall include factory-installed optional copper/copper and vinyl-coated refrigerant coils.
2. Economizer:
   a. Economizer controls capable of providing free cooling using outside air.
   b. Equipped with low leakage dampers not to exceed 3% leakage, at 1.0 in. wg pressure differential.
   c. Spring return motor shuts off outdoor damper on power failure.
3. Flat Roof Curb:
   Curbs shall have seal strip and a wood nailer for flashing and shall be installed per manufacturer's instructions.
4. Manual Outdoor Air Damper:
   Package shall consist of damper, birdscreen, and rainhood which can be preset to admit outdoor air for year-round ventilation.
5. Thermostat:
   To provide for one-stage heating and cooling in addition manual or automatic changeover and indoor fan control.
6. Low Ambient Package:
   Shall consist of a solid-state control and outdoor coil temperature sensor for controlling outdoor fan motor operation, which shall allow unit to operate down to 0° F outdoor ambient temperature in cooling.
7. Filter Rack Kit:
   Shall provide filter mounting for downflow applications.
8. Square-To-Round Duct Transitions:
   Shall have the ability to convert the supply and return openings from rectangular to round. (030-048 only)
9. Crankcase Heater:
   Shall provide anti-floodback protection for low-load cooling applications. (Standard on 042-060 sizes)
10. Electric heaters:
    a. Electric heater shall be available as a field-installed option.
    b. Heater elements shall be open wire type, adequately supported and insulated with ceramic bushings.
    c. Electric heater packages must provide **single point** power connection capability.
11. Compressor Hard start kit:
    Shall be available to give a boost to the compressor motor at each start-up.

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